



SOME ACCOUNT
OF THE
YELLOW FEVER EPIDEMY
BY WHICH
BRAZIL WAS INVADED IN THE LATTER
PART OF THE YEAR 1849.

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P R E F A C E.

In drawing up the following Paper for the Epidemiological Society, my object was to eliminate from the voluminous documents to which I had access, just as much of their substance as was required for a brief, but fair and impartial account of the Yellow Fever Epidemy which has lately invaded Brazil.

And although the paper is now relieved (so to speak) from the compression to which it was subjected, in order that the time occupied in reading it should not exceed one hour, I have not considered it as yet necessary to extend the subject beyond the addition of some new facts which have been recently supplied me by Dr. Alexander Paterson, of Bahia, and Dr. May, of Pernambuco.

With these exceptions the paper is, in every respect, the same as when I had the honour of submitting it to the President and Members of the Society.

J. O. M'W.

14, *Trinity-square.*

April 28th, 1851.

SOME ACCOUNT

OF THE

YELLOW FEVER EPIDEMY IN BRAZIL.

BRAZIL occupies a great portion of South America, extending from 5° north to $32^{\circ} 30'$ south latitude, and from 35° to 70° west longitude.

Viewed upon the map, Uruguay, La Plata, Bolivia, Peru, Columbia, and the other countries of this great continent, seem to form but a margin of variable width to the southern, western, and northern limits of the Brazilian territory.

The central and eastern portions of Brazil are occupied by high table lands, traversed by serrated mountain ranges. The lowlands to the northward comprehend the great plain of the Amazon, and the flat lands extending from it far to the eastward; a country among the richest in the world, and containing immense tracts of impenetrable forest. The lowlands to the southward include the greater part of that country lying south of a line drawn from eastward in a north-western direction, in the parallel of 29° south. Here there is a vast extent of pasture land, cut up in all directions by rivers, lakes, and marshes, and abounding with herds of cattle and horses.

The lowlands on the eastern side or seaboard of Brazil, vary in extent from 120 to 15 or 20 miles from the sea.

Following the course of its various indentations, the coast itself comprehends a distance of 4000 miles, which may be thus rapidly described. From its southern extremity, as far as 29° south, it is low and sandy; it then becomes rocky as far as the bay "Espírito Santo" in $20\frac{1}{2}^{\circ}$ south; and from this to Bahia the coast is again low and level. Proceeding northward, and then bending to the westward, the coast is first of moderate height and then slopes away, low and marshy, as far as the Amazon.

The climate is cool and temperate between 28° and 33° south, and moderate within the southern tropic even as far as 15° south.

At Rio de Janeiro, in about 23° south, the medium heat is 74° . In summer, that is to say, during December, January, and February, the average heat at noon is 86° Fahr., the minimum 72° . During winter, or the months of June, July, and August, the temperature at noon is 72° , minimum 59° . There are heavy falls of rain, with thunder

and lightning, during the summer. As we proceed towards Bahia and Pernambuco, and further northward, the temperature increases; but, as these ports are more open to the winds, the heat at them is said to be less oppressive than at Rio de Janeiro. The seasons are of course earlier, and less distinctly marked, proportionately to their proximity to the equator.

Throughout the whole line of coast, the climate is of the most beautiful description, its general tranquillity being seldom disturbed by any more violent winds than the trades, or the daily land and sea breezes.

Mr. Cowper, the Consul at Pernambuco, a gentleman of great observation, who was not only present, but most actively and usefully engaged, during the prevalence of the recent yellow fever epidemic in that Province, says:—"The climate of the whole Brazilian tropic is moderate and varies very little. At Para, upon the line, the thermometer scarcely ever changes. During the day, in summer, it invariably stands at 86° Fahr., and during the night it falls, with the land breeze, to 65° , and sometimes to 60° Fahr. In the winter, the temperature during the day is 84° Fahr., at night 72° , owing to the absence of the land breeze in winter. This state of climate will apply to the whole coast, as far as Cape St. Roque, (lat. 5° south.) From thence to the southward of Bahia (lat. 13° south) the temperature is about two degrees lower; and Rio de Janeiro, although far south, (lat. $22^{\circ}53'$ south,) owing to its geographical position, is said to be equally warm."

Notwithstanding the geographical position of Brazil, its great variety of climate, and its abounding in those elements which theoretically are supposed to induce the more aggravated forms of tropical disease, endemic disease, except in a mild form, is little known; from sweeping epidemic disease, of any kind, with the exception of small-pox—introduced by slavers(a)—the country has, until lately, been generally considered as wholly exempt.

It was, therefore, with astonishment not unmixed with doubt, that information of the existence of yellow fever in the city of Bahia, in the month of November, 1849, was received in the other parts of the empire; and it was not until the disease had extended to Pernambuco and Rio de Janeiro, that the people in general could be led to believe that so formidable an invader had arrived among them.

(a) Mr. Cowper doubts that the introduction of small-pox is due to the slavers, for from the earliest times the Indians are said to have suffered from this disease. Mr. Cowper informs me of the curious fact, that hydrophobia was unknown in Brazil until within the last few years; but that it is now as common and as fatal as in Europe, and is attributed by the Brazilians to the importation of foreign dogs.

I shall now endeavour to trace the origin and progress of the yellow fever epidemy of Brazil, commencing with Bahia, and then taking up the other ports of the empire in the order, so far as my information enables me, according to which they were respectively invaded by the disease, prefacing the account of the fever at each place by some brief topographical remarks.

Bahia.—The town is situated in lat. 13° south, within the north-eastern boundary of the magnificent Bay of All Saints. The shore rises high, and is richly wooded. The lower town, the resort of the shipping and the great mart of trade, consists of long narrow streets, filthy, and badly paved. The upper town rises abruptly behind, is beautifully situated, and contains some fine buildings and private residences.

The population of Bahia is about 140,000; of whom one-third are whites; the same number are mulattoes, and the rest negroes.

The rocks belong to the granitic series. Darwin, in his "Narrative of the Voyages of the Adventure and Beagle," says, "throughout the coast of Brazil, and certainly for a considerable space inland, from the Rio Plata to Cape St. Roque, lat. 5° south, a distance of 2000 geographical miles, wherever solid rock appears, it belongs to the granitic formation."

I may also mention, that at a point near the city Darwin observed an appearance in the granitic rocks which has been discussed by Humboldt, who states that "at the cataracts of the great rivers Oroonoko, Nile, and Congo, the syenitic rocks are coated by a black substance, and look as polished with plumbago." It is a curious fact, that the Indians, and even the Missionaries of the Oroonoko, connect the unhealthiness of the villages round the cataracts with those rocks which they describe as carbonized or burned by the rays of the sun. They carefully avoid sleeping near these black rocks, which they imagine are fertile sources of the "calentura" or fever. Their insalubrity is so proverbial, that villages are not built in such localities, if space elsewhere can be found.

The insalubrity of Hong-kong has been by some connected with the granite rocks which abound in that colony.

Bahia had for several months enjoyed an immunity from all diseases except those common ailments incident to every such community, when, on the 30th September, 1849, the American brig Brazil arrived at that port, her papers said from New Orleans, but, as was afterwards ascertained, actually last from the Havannah. She had lost two men on the passage from fever, attended with black vomit; but, as their deaths were not reported to the authorities, the vessel was not placed in quarantine. The circumstance of admit-

ting to immediate pratique a vessel from New Orleans, the very focus, as it was said, of yellow fever, while quarantine was being rigorously enforced upon all vessels coming from European ports where cholera prevailed, was much discussed by the people in the town, and even became the subject of comment in the public prints.

I have already said that the Brazil arrived on the 30th of September. It is of importance also to state, that we have no account of any case of yellow fever occurring, either in the town or in the harbour, earlier than the 3rd of November. On that day, Dr. Paterson, one of the chief medical men of the place, was called to his first two cases of yellow fever. "One of them was a Brazilian boy, living over the American store, frequented by the captain of the Brazil. He had been ill," says the Doctor, "for some days prior to my visit, and on the afternoon of the 3rd he had black vomit, and died within a few hours." On the same day, Dr. Paterson was also called to an Englishman who had long resided in the country, and who had had frequent communication with the captain of the Brazil. During the convalescence of this, the second patient, fell ill the third case,—a young man, recently from Europe, living in the same house, and still more intimate with the captain. At the end of nine days he died of black vomit. Dr. Paterson adds: "One of the first fatal cases, and immediately succeeding those of my own, was the American Consul, also not long in the Brazils, and who constantly associated with the captain of the Brazil, and with him frequented the house of my second and third patients." He continues: "I could thus go on through a considerable number of cases, in the early part of the epidemic, tracing out the transmission of the disease from one person to another; as the number of foci of infection increases, the task would of course become the more difficult."

I have just invited attention to the importance of there being no account of any case of yellow fever on shore before that of the Brazilian boy, seen by Dr. John Paterson on the third of November. But since this paper was written, I have heard from Dr. Paterson's brother, Dr. Alexander Paterson, surgeon of the British Hospital, Bahia, and now in this country, that the case of the Brazilian boy, although his brother's first case, was not the first case in the town. Dr. Alexander Paterson "ascertained beyond doubt" that the Brazil took in several Spanish passengers at the Havannah, which, on landing, took up their abode chiefly in that part of the town of Bahia called "Santa Barbara;" and that in this very district yellow fever broke out within three weeks after the Brazil's arrival: but its occurrence was

carefully and, for a long time, successfully concealed by parties connected with the slave-trade.

Up to the 18th of November, no recorded case had occurred afloat. In a day or two, however, two deaths were reported in a Swedish brig, which was the next vessel to the Brazil, and, being consigned to the same house, had frequent intercourse with that ship. And two other deaths, as it afterwards appeared, had already occurred on board the Swede without any medical man having been called. In a few days, every man on board the Swedish vessel had caught the disease, and the greater number of them died. It was not until the 3rd of December that there was any case among the English shipping. From this time, however, there was scarcely a vessel in port that escaped. Once the disease had established itself on board of a vessel, says Dr. Paterson, "it was the rarest thing possible for the fever again to quit it until every one capable of catching it had caught it." Meanwhile the disease had extended over the town and immediate suburbs, and ceased not to rage until it had "burnt itself out for want of fuel." "It spread," says Dr. Paterson, "to the suburbs and the adjoining country in radiating lines, in a direct ratio with the amount of traffic in any given line." By the end of February, it had attacked not less than 96 per cent. of the inhabitants. Out of 700 seamen (English) in port, between the 1st December, 1849, and the 28th February, 1850, 223 were attacked, and 72 died. Among the native Brazilians, "and those long resident in a tropical climate, the disease was comparatively mild; not fatal, certainly, in 1 per cent. Among the African blacks it was still milder. The native coloured population suffered as numerously, but, perhaps, less severely than the whites." In those recently arrived from extra-tropical climates, the fever assumed a more intense and malignant character, the mortality amongst such having exceeded 25 per cent.

Pernambuco, in 8° south, which was invaded by yellow fever next after Bahia, is built upon a low, swampy land, surrounded by an undulating range of hills, it may be 200 feet above the level of the sea. On one extremity of this range, and five miles to the northward of the city, the old town of Olinda is situated. The city is divided into the three districts of Recife, of San Antonio, and of Boa Vista, which are connected with each other by wooden bridges. Boa Vista, where the British Hospital is situated, is the cleanest and airiest part of the town, and that furthest removed from the harbour, near to which the streets are narrow, rather filthy, and in bad order. As the river is influenced by the tide higher up than the town, the water there is unfit for use, but a good supply of wholesome water is obtained

from the Rio da Prata, about two leagues from the city. The banks of the river are studded with the mangrove. A secure natural harbour is formed by a reef of hard sandstone, which runs parallel to, and not far distant from, the shore.

The city contains 120,000 persons, viz. :—

1. Whites, native	34,000	
„ foreign	6,000	
	<hr/>	40,000
2. Blacks, native	30,000	
„ African	20,000	
	<hr/>	50,000
3. Mulattoes		30,000
		<hr/>
		120,000

On the 17th day of December, 1849, the French bark *Alcyon* arrived at Pernambuco from Bahia, having lost two men on the passage from yellow fever. (a) Notwithstanding this she was admitted to pratique, and anchored among the other vessels in the harbour. Some fresh cases of fever occurring on board, they were sent to the French hospital (situated in San Antonio;) but one of them having terminated fatally on the 19th, the authorities ordered the rest to be re-embarked, and interdicted all communication with the *Alcyon*. The Consul, writing on the 21st December, says, "No cases have as yet to my knowledge occurred within the city. The authorities have ordered all vessels from Bahia to be placed under quarantine for eleven days." In a postscript to the same letter, he adds, "Two cases have since been reported on shore." (b) On the 25th December, Dr. Paton, an English medical man, young, healthy, and robust, and but a short time in the country, was attacked with fever in the British Hospital at Boa Vista, and died on the 27th. The immediate cause of death was at first supposed to have been epilepsy. He laboured for some days under low fever, and was found upon the floor of the room, and almost instantly died, the body turning bright yellow.

(a) Dr. Paterson, of Bahia, states, that four men were sent on shore ill with fever just before the *Alcyon* sailed from that port, although she was granted a clean bill of health. A correspondent at Bahia, writing on Jan. 29, 1850, says, "Accounts have been received, that the epidemic has made its appearance at Rio and Pernambuco, which is not surprising, as the authorities here, until now, denied its contagiousness, and continued to grant clean bills of health to all vessels."

(b) Dr. May, from whom I have heard since this paper was read at the Epidemiological Society, says, "One or two cases appeared in the town, and were speedily fatal, but nothing was said about them, in order not to create alarm. In the last days of December a seaman came into the British hospital with broken ribs from a Brazilian steamer, in which he had arrived direct from Bahia, where he had been on shore for some time. A few days after the admission of this man Dr. Paton was attacked. The seaman had no fever on admission, but he was emaciated and sallow."

On the day of Dr. Paton's death, another gentleman, the house apothecary, Mr. Pitt, also residing at the British Hospital, was seized with fever, and died on the fourth day with suppression of urine and black vomit. At this time there were only three other patients in the hospital—one with phthisis, one with ulcer, and the other with paronychia. On the evening of the day on which Mr. Pitt was attacked, the seaman with paronychia, was seized with similar symptoms. Next morning his countenance was anxious, and his extremities were cold, and he died on the following day with black vomit. Dr. May and his housekeeper, who attended Mr. Pitt, were next attacked. Both recovered, but the housekeeper's escape was a narrow one. During Dr. May's illness, the seaman with ulcer was taken ill, and, although sedulously attended by a friend, he also died. After this, all Dr. May's black servants in the house were attacked, but none of them died.

The man with phthisis escaped.

Dr. May and Dr. Arckbuckle, the two chief practitioners of the place, both declared that Mr. Pitt died of yellow fever; but it was resolved, at a consultation held by the chief men in the profession, with the view of preventing alarm, to conceal the existence of the disease in the city.

The Consul, writing at this time, says, "It is hoped that the general purity and breadth of the streets, intersected as they are in all directions by the rivers, the perpetual sea breeze, and the clearness of the atmosphere, will at once check the disease, although for the present the city may be looked upon as threatened by invasion from without, and by pestilence within." (a)

The disease, however, radiated in all directions from the Boa Vista Hospital, so that, by the 14th of January, most of the inhabitants in that part of the city had been attacked; and its course, say the best authorities, could be traced step by step, from one district to another, all over the city, and even throughout the province.

So early as the 6th of January, the disease had spread to the shipping anchored in the harbour near the Alcyon, proving extremely fatal to those newly arrived in the country.

On board a Prussian vessel lying in the same tier with the Alcyon, a man was attacked shortly after the Alcyon's arrival with excruciating pains in the loins and legs, and died on the third day with black vomit. Although the Prussian vessel was quite new and remarkably clean, the captain had her fumigated, and used chloride of lime daily. Still in a day or two after another man was attacked, and he also

(a) Civil war was raging at this time.

died in a few days with black vomit. Others followed in rapid succession, until this vessel had lost eight men out of a crew of twelve.

The next vessel in which the fever broke out was an English barque, called the *Esther Anne*, a perfect model of cleanliness. She was also in the same tier with the *Alcyon*, and she lost her mate and four or five of her crew all from yellow fever. During the whole of this time, not a single case occurred in any other ship in the port, except among those in the same tier with the *Alcyon*.

The fever gradually extended from ship to ship, until all, with very few exceptions, were infected.

One English ship, the *Columbus*, anchored very high up the harbour, far from every other vessel, escaped entirely.

Another vessel, laden with guano, escaped for a long time, and the captain attributed his good fortune to the nature of his cargo. A day or two, however, before this vessel left Pernambuco, one of her sailors went on a visit to an infected ship. He was soon seized with fever and died, as did also the mate who attended him. Hundreds of similar instances might be narrated.

By the 20th of February, not less than 30,000 persons had been attacked on shore by the fever, and it had also extended to English, Portuguese, and Imperial men-of-war in the harbour. On board the Imperial corvette there were twenty cases of fever. At this time the business of many of the public departments could scarcely be carried on, from the number of *employés* affected.

The weather was at this time very hot. "On the 27th," says the Consul, "the sun will be vertical, and it is to be hoped that shortly afterwards we may have a change for the better."

These hopes were not, however, realised, for early in March the fever had increased in intensity, "no longer confining itself to persons newly arrived in the country, but proving fatal to natives as well as foreigners. By this time eleven of the British community, and probably two thousand residents, had perished. The Consul had already established an hospital on one of the islands in the bay, to which, during the month of February, seventy seamen, American, Hamburghian, and Swedish, were admitted, of whom forty-one died. Of forty-one British seamen, twenty-seven died.

This increased mortality of the disease was considered the more remarkable, as the Consul at this period observes, "the arrangements are all improved, the weather latterly uncommonly cool for the season; the medical men have increased experience, and the people invariably adopt habits of precaution; but nevertheless the plague increases both on board and on shore."

Nothing could be better than the judicious arrangements suggested by Mr. Cowper, the English Consul, for the accommodation of the sick. Finding that the hospital was crowded, he, with the permission of the President of the Province, caused tents to be erected on Cocoa Nut Island, and afterwards had the sick treated on board their own ships, lying on deck, under awnings, exposed to a free circulation of air.

Mr. Cowper, to whom I am indebted for so much valuable information regarding this epidemic, thus classifies those that were attacked by fever at Pernambuco:—"1. New comers; 2. Seamen; 3. Residents of less than two years, not perfectly acclimated; 4. Natives of the first class from the southern provinces and from the interior, including North and South Americans, and even Brazilians. Of the second class, during the first month, the deaths were 1 in 3; during the second month, 1 in 2; during the third month, 2 in 3; during the fourth month, 4 in 5; and the mortality increased in proportion as the number attacked decreased. Of the third class very few escaped attack, and certainly not more than half death. Of the fourth class scarcely one escaped attack, but the disease was in a mild form; whilst nearly 100 per cent. of the two first classes, and 50 per cent. of the third, fell victims, not more than 3 per cent. of this class died."

Without reference to race, 16 per cent. of all foreigners attacked died, and 3 per cent. only of the natives.

The Sardinians, from some unknown cause, suffered more severely, both afloat and on shore, than other foreigners. According to Dr. May, the mortality afloat was 60 per cent. of those attacked.

Rio de Janeiro, the capital of Brazil, lies in 22°53' south latitude, and 43°12' west longitude, on the western side of a magnificent bay, not less than sixty miles in circumference, containing numerous islands, and surrounded by a scenery of surpassing beauty. Dr. Lallemand, one of the reporters on the yellow fever of Brazil, considers this bay to represent a "microscopic daguerreotype" of the Gulf of Mexico. "At Rio," he says, "we have a regular but almost landlocked bay, little subject to the influence of the ebb and flow of the tide, and into which a series of rivers discharge themselves, at whose marshy mouths, *Paullinieæ* and *Avicennieæ*, and the wondrous forms of the *Rhizoporeæ* determine the zone of vegetation."

The city is built on an undulating plain, which is said to have been a swamp, and is scarcely elevated above the sea level. There still exists a considerable marsh in the immediate vicinity of the city, to the westward. The salt water passes freely through a small creek, and mingles with the

waters of this marsh. Although this source of malarial exhalation is, according to Dr. Leonard, surgeon of Melville Hospital, Chatham, not less than fifteen hundred paces long, and nearly five hundred paces wide, the inhabitants of its neighbourhood are said to be not more liable to fever than those in other parts of the city.

The mountains which encircle Rio consist of granitic rocks, and the soil is composed of disintegrated granite, with a variety of clays in beds of considerable depth.

The city itself occupies about three miles along the shore. There are some fine squares, but the streets in general are long and narrow. Sewerage and public cleanliness are matters of little concern. There are a few drains, but they seem to be little attended to, and, from the flat situation of the city, there is no run of water through them. The town is well supplied with good fresh water. The large aqueduct which conveys it from the Corcovado Mountain, is one of the most remarkable buildings in the city.

Situated just within the southern tropic, and environed by hills which partially intercept both the sea and the land breezes, Rio possesses an excessively sultry atmosphere, especially when the sun is south of the equator. From November to April, (the most sultry period,) a good deal of rain falls; the air is generally moist, and the heat is oppressive. From May until October the weather is drier.

In 1847, according to Dr. Leonard's observations, the thermometrical indications were as follow :—

	Maximum.	Medium.	Minimum.
August	78°	69°	61° Fahr.
September	81°	75°	69°
October	83°	72°	68°
November	83°	74°	69°
December	86°	77°	71°

The population may be estimated at about 100,000 whites, and 200,000 negroes and mulattoes.

The information regarding the invasion of Rio de Janeiro by yellow fever, and the subsequent course of that disease through the city and other parts of the province, is both voluminous and clear. The documents to which I have had access consist of :—

1. A Full Account of the Rise and Progress of the Epidemy at Rio de Janeiro, embracing the Histories of the first twenty Cases on Shore. By Dr. Lallemand, a German Physician in practice at Rio.

2. Replies to Queries sent to Rio de Janeiro. By Sir William Pym, Superintendent-General of Quarantine; with Observations by Mr. Lee, Surgeon, Rio de Janeiro.

3. Replies to Queries, with Observations; and a small

Pamphlet on the Fever. By Dr. Croker Pennell, Rio de Janeiro.

4. Replies to Queries; with a Description of the Yellow Fever, and Remarks on its Successful Treatment on the Homœopathic Principle. By Mr. Cockran, a surgeon and homœopathic practitioner at Rio de Janeiro.

Besides these, there are several highly important official papers.

By the concurrent testimony of all these authorities, Rio de Janeiro was considered to be in a state of general good health prior to the latter end of December, 1849.

Intelligence that a malignant fever was raging at Bahia reached Rio by the Portuguese steam-vessel, *Don Alphonso*, on the 13th December, 1849. On the following day, the Portuguese ship *Don João* arrived from Bahia, five of her crew having sickened, and two having died, during the passage. This vessel was accordingly placed in quarantine. The English packet *Petrel*, also from Bahia, arrived on the 23rd or 24th December, (a) with two cases of yellow fever on board—a passenger and the steward of the vessel. One of them died on the 25th, and the other on the 27th, while the vessel was in the harbour of Rio. (b)

The first known case of yellow fever in the city of Rio de Janeiro was seen on the 28th December; (c) on which day, says Dr. Lallemand, “On entering Fergusson Ward in the large city hospital, ‘Misericordia,’ to which I have been physician for seven years, I found two new patients whose appearance greatly struck me, and who presented a complication of morbid phenomena, especially a ‘yellow colour of the skin, black vomitings, suppression of urine, hæmorrhage from the mouth and bowels;’ and, in the case of one of them, great disturbance in the mental faculties, which led me to suppose something peculiar in these cases.”

The cases were—

1. Enquist, from Finland; who had arrived about a fortnight before, direct from Russia, by the Russian brig *Volga*, and had been ill some days.

2. T. Andersson, a native of Sweden, who had arrived as sailor on board the barque *Navarre*, and had also been ill some days:

(a) Dr. Lee, December 23rd, 1849.

(b) They had both been on shore at Bahia, and had visited a house where a person was lying ill of yellow fever, and who afterwards died.—Dr. Lee’s “Replies to Queries.”

(c) Dr. Lee: “The first case of yellow fever in Rio was at the Brazilian Hospital, on December 28th.”

Dr. Croker Pennell; “The first known case of yellow fever occurred in the instance of a seaman, who was attacked and taken to the public hospital on December 28th.”

The patient No. 1 died the following night. No. 2 also died after forty hours, and on the 30th December.

Keeping these, the first known cases of yellow fever in the city of Rio de Janeiro, (a) stedfastly in view, it now becomes necessary to bring into prominent light the proceedings of the barque Navarre and her crew, already alluded to, during the months of November and December, as this vessel occupies an important place in the history of the epidemic.

The Navarre sailed from Bahia, in ballast, on the 24th November, 1849, and arrived at Rio de Janeiro on the 3rd December. (b) As we have already seen, yellow fever was raging at Bahia at the time the Navarre left that port. The Navarre's crew were, to appearance, in good health; the vessel was sold, and the men were paid off. Some of them went into other vessels, and were no more heard of; others went on shore at Rio, and took up their abode in the Rua da Misericordia, at a lodging-house kept by a man named Frank. The sleeping apartment on the ground-floor of this house was at this time very dirty, and many sailors were congregated in it. Close to Frank's house, on the opposite side of the way, were two other lodging-houses, the one kept by an Englishman named Wood, and the other by a Frenchman called Auguste Hourde. The lodgers of these houses very frequently visited each other.

I have already said, that some of the sailors of the Navarre went to lodge with Frank. When Dr. Lalle-mant visited Frank's house early in January, in consequence of the arrival of three fresh yellow fever cases from it into the Misericordia Hospital, he then learnt that Andersen, the subject of case No. 2, and Josiah Baker, another seaman of the Navarre, by this time also in the hospital, were the first that sickened at Frank's house; and that Enquist, the subject of Case No. 1, had lodged in an apartment behind Frank's house, where he was a frequent visitor. Dr. Lalle-mant says, with reference to these cases,

(a) These were the first cases in the city. Dr. Lalle-mant, however, observes: "When, on the 11th of January, 1850, at a sitting of the Medical Academy of this place, I submitted the cases of yellow fever which had come under my own observation, Dr. Noronha Feitel stated a case which had occurred at the Naval Hospital on the 29th December. On that day, a man who had come from Bahia in the steamer Don Pedro, was admitted into the Naval Hospital on the Ilha das Cobras; when he died soon after of black vomit and diarrhœa. Now, although this case occurred almost close to the city, no further consequences ensued; nor did the physician of the hospital attach any importance to it, for he did not speak of it until a fortnight afterwards, in consequence of my statement at the Academy; and even then he merely mentioned it casually. So that it loses all importance which might otherwise attach to it."

(b) Dr. Lee and Dr. Pennell, 2nd December, 1849. Mr. Cockran, end of November or beginning of December.

"Enquist was admitted on the same day as Andersson, and I am perfectly satisfied he caught the fever by frequenting Frank's house."

By the 10th of January ten cases of yellow fever, of which seven proved fatal, had been admitted into the Misericordia Hospital; all of them were either from the lodging-house of Frank or Wood. One man, who refused to go into the hospital, was treated at Frank's house.

On the 10th of January, Robert Luff, an Englishman, was admitted to the hospital with yellow fever. He had been frequently under Dr. Lallemant's care for wounds in his legs. He was a drunkard and a vagabond, and had been lodging at Wood's, where he sickened. He died in forty-eight hours. About the same time another Englishman, called Thomas Fox, also from Wood's, came into the hospital with symptoms of yellow fever, but he recovered.

Dr. Lallemant's attention being thus called to Wood's house, he proceeded thither, and found Wood himself, his wife, and a German waiter, all suffering from yellow fever in a comparatively mild form.

Auguste Hourde, the landlord of the French lodging-house, had meanwhile been admitted into the hospital on the 3rd of January. He left it on the 5th; but, suffering a relapse, he returned, and died of malignant yellow fever after five days. Hourde's wife had also a slight attack on the 17th January, but she recovered.

By the 19th of January, Dr. Lallemant had seen and treated twenty cases of yellow fever, all them belonging to the houses of Frank, of Wood, or of Hourde. Of these, fourteen were admitted to the hospital in a hopeless state, and ten died.

The histories of the whole of these cases are detailed with great clearness and circumstantiality by Dr. Lallemant. That they were the first cases of yellow fever on shore in Rio de Janeiro, there seems no reason to doubt; for, besides Dr. Lallemant, Dr. Croker Pennell, Dr. Lee, and others, distinctly refer the outbreak of the disease in the city to the lodging-house in the "Rua da Misericordia."

The patient Enquist, whose name stands first in the hospital list, had frequently visited the Russian and Finland ships in the harbour; in fact, he sickened while actually on board one of them. Suddenly, a captain, a steersman, and a sailor, died from an acute attack of yellow fever on board the Finland vessels Niord and Norna, on the 9th January, 1850; and, on the following morning, several patients from these vessels, and from the Swedish ship Scandia, were received into the Misericordia Hospital.

The yellow fever consequently prevailed in the harbour so early as the 9th of January.

WITH reference to the appearance of the fever on board another vessel, Dr. Lallemand has the following remarks:—

“In the Rua da Misericordia, between the lodging houses of Hourde and Wood, separated from each by a few intervening dwellings, and exactly opposite Frank’s, (the street being about twenty-four feet wide,) is the mercantile house of a German coffee merchant, whose eldest daughter had arrived from Hamburg in the ship *Maria Christina*, in the middle of December, bringing with her a strong healthy girl. This girl went frequently to the merchant’s house, was taken ill on the 8th of January, and died on the 13th, at the house in the Rua da Misericordia, of fully developed yellow fever.”

The sailors of the *Maria Christina* frequented the merchant’s house, and in the course of a few days the fever broke out on board that vessel. The crew of the now infected ship purchased their fresh meat at a Danish butcher’s in the Praga da Don Manoel. The apprentice, a German, who sold them the meat, was seized with a violent attack of yellow fever on the 8th; but he recovered in three weeks.

In consequence of the great influx of patients into the hospital from the vessels, on or about the 18th January Dr. Lallemand was ordered to take all his yellow fever patients in the hospital to an uninhabited convent on the “*Ilha da Bon Jesus*,” distant about six miles from the city. It was not until now that Dr. Lallemand’s diagnosis, given on the 30th of December, and hitherto severely combated, that the disease was yellow fever, was considered incontestably true.

“From this period,” says Dr. Lallemand, “it was impossible for me to take cognizance of all the cases of yellow fever that occurred. The disease fixed itself in the Rua da Misericordia, proceeding from the house above mentioned, running almost without interruption from house to house, though with milder symptoms, and even passed into the narrow or cross streets, until that entire quarter had sickened, while, during that and the following days, not a single suspicious case occurred in any other part of the city.”

Towards the end of January the disease seems to have manifested itself in many streets along the river, running down to the banks, and at length surrounded the whole city.

The account of the rise and spread of the fever at Rio de Janeiro, given by Dr. Lee, Dr. Croker Pennell, and other reporters, differs in no important particular from the elaborate report of Dr. Lallemand. Dr. Pennell says, in his pamphlet, that the disease for the first fortnight was confined to the Rua da Misericordia; and that the locality next

infected was the "Saude," situated at the opposite end of the city, about a mile and a half distant from the Rua da Misericordia. This district is only a little elevated from the high-water level, with a clayey soil interposed with open gutters, affording a ready lodgment to stagnant water.

According to Dr. Lee, also, the first cases appeared in a sailors' lodging-house, in the "Rua da Misericordia," and then spread along the shore, "attacking vast numbers who inhabited the 'Prainha' and 'Sande,' both localities immediately contiguous to the loading-ground of the merchant shipping. From these spots it quickly spread over the city, attacking all classes."

"In the harbour," continues Dr. Lallemant, "the disease did not take any sudden leaps, but went slowly from ship to ship. There then were lying alongside each other, the Norna, Niord, Scandia, Alfchild, Elizabeth, Maria, Helsinfor, Louisa, Vestalinden, Adam, Brave, Frode, and also another Niord, all carrying different amicable flags, so that the captains and crews visited each other; whereas the American and English vessels, which had less intercourse with the above-named ships, were not attacked by the fever till afterwards."

Subsequently the crews of the Brazilian men-of-war were affected by the fever; and now the far-spreading epidemic raged in and around Rio de Janeiro and in the harbour. "Thus," continues Dr. Lallemant, "the yellow fever was brought into the 'Rua da Misericordia' by the crew of the American vessel coming from Bahia. Here it propagated itself, and was from thence carried into the harbour. And we see the first cases developing themselves, linked together as unquestionably as the closely united links of an iron chain."

While the fever was raging along the flat coasts of Rio, the mountain districts of Petropolis, Nueufreiburg, and Constantia continued perfectly healthy. Accordingly, in February and March, the coast, and numbers of the residents of the city, and of the newly arrived Europeans, fled for safety to those elevated regions. Several were attacked within three or four days after their arrival in the mountains, and some died; but in no case was the disease communicated to the mountain residents. If, however, the German or other colonists of Petropolis, or of any of the other mountain districts ventured down to the flats of Rio, they were almost sure to contract the fever.

This is in perfect accordance with what Humboldt states regarding yellow fever in Mexico. The great "Oracle of Nature" says, "The whites and the Mestizos who inhabit the interior table-land of Mexico, of which the mean temperature is 60° and 62° Fahr., and where the thermometer

sometimes falls below the freezing point, are more liable to contract the vomito, when they descend to the Plan del Rio, and from thence to la Antigua and the Port of Vera Cruz, than the Europeans or inhabitants of the United States who come by sea." The farm of L'Encero, which Humboldt found to be 3043 feet above the level of the sea, is the highest limit of the vomito. "Here the inferior limit of the oaks warns the colonist who inhabits the central tableland, how far he may descend towards the coast without dread of the mortal disease of the vomito."—*Political Essay*, &c. Vol. II. P. 251.

Petropolis, according to Dr. Croker Pennell, is situated at a height of nearly three thousand feet above the level of the sea. (a) In the month of February, (summer,) the thermometer ranges, from the hottest hour of the day to the coldest hour at night, from about 68° to 80° Fahr. In March, its range is from 62° to 75° Fahr. ; in April, from 56° to 72° Fahr. In the coldest night in the depth of winter, (July,) the thermometer occasionally falls as low as 36° Fahr.

The thermometric maxima and minima are here too loosely stated to warrant the application of any of the usual methods of educing from them the true mean temperature with rigorous accuracy ; still I think it may be safely inferred, that the mean temperature of the hottest month mentioned, barely reaches the point at which, according to Humboldt and others, yellow fever can be maintained, at all events for any length of time ; and, moreover, the indispensable condition of a certain duration of high temperature is wanting. Dr. Croker Pennell states in his report, that the absence of infectious property in the disease at Petropolis cannot be explained by the difference of temperature ; for the temperature of the atmosphere at Petropolis was higher at the time the fever patients were there than it was in Rio de Janeiro, in July, 1850, where there were still some bad cases of yellow fever. Dr. Pennell has here overlooked the necessity for a continuance of high temperature to keep the disease alive ; for instance, May is a warmer month at Vera Cruz than September or October ; but it is in the two last months that the "vomito" commits the greatest ravages, showing that a certain time is required for the germ of the disease to be developed in full energy. At Vera Cruz the yellow fever does not appear before the medium heat is 75° Fahr., and it never passes the limit of an elevation of 3000 feet above the sea level. As was the case at Petropolis, people frequently carry the disease from the flats near Vera Cruz to the town of Jalapa, situated at a height of 4335 feet, on one of the terraces which occur in the steep ascent to the

(a) According to Dr. Lallemant, about 2000 feet.

high table-lands of Mexico; but they have never been known to communicate it to others there.

I have not been able to ascertain with any degree of accuracy the number of deaths from the epidemic at Rio Janeiro and the other provinces of the empire; but it is probable that at Rio Janeiro alone not less than 10,000 or 12,000 persons perished.

At Rio Janeiro, and indeed everywhere else, the disease dealt its fury upon the natives of extra-tropical climates, and more especially upon new comers from the more northern latitudes. Hence, says Dr. Lallemand, "Norwegians, Swedes, and Finlanders, constituted the melancholy trio which furnished the greatest number of victims. The crews of many Swedish and Finland vessels died almost systematically one after the other, and almost invariably after suffering from three to five days." The men of the most colossal stature died most rapidly. Of 299 northern patients treated at the hospital of Bon Jesus, 154 died, and only 145 recovered.

The mortality among the newly-arrived Portuguese was also very remarkable. "In the literal sense of the word, whole families were swept off by this fever." Next to the Portuguese, the Italians suffered most. Of the company composing the Italian opera, seventeen died; as did also nearly every member of an equestrian company. For a long time not a single image-vender, rag-merchant, or umbrella-seller, (who are almost without exception Italians,) was to be seen in the streets of Rio. In many instances, half the passengers who arrived by vessels from Havre de Grace,—nay, sometimes even three-fourths of them, died within three weeks after their arrival.

The three foreign embassies of Paris, Rome, and Washington, each lost its Secretary of Legation.

Dr. Lallemand found the greatest powers of resistance among the English and Americans, and the least among those before named, viz., the Finlanders, Swedes, and Norwegians; and next to these the Italian seamen from the west coast of Italy.

Having thus given some account of the epidemic in the chief ports of Brazil, it now becomes necessary, in order to clear the ground for the more important points of the inquiry, to determine—

1st. The state of health in Brazil prior to the invasion of that country by the recent epidemic; and

2nd. The precise nature of the epidemic, and whether it manifested itself everywhere in Brazil as the same disease.

The general salubrity of the whole coast of Brazil, south of the equator, in spite of the presence of those conditions of soil and of atmosphere usually considered favourable to the production of disease, has been so remarkable as to

cause men engaged in clinatorial inquiries to pause before they adopted the commonly-recognised theories as to the origin of fevers and those other forms of disease which are so rife within and in the neighbourhood of the tropics.

And certainly it was not easy for an inquisitive mind hastily to admit the cause-and-effect relation of marshes and rich rank soils, acted upon by heat, and other meteoric agencies, with the worst form of fevers, when it was seen that so great an extent of territory as Brazil, situated in chief part within the tropics, and abounding with every supposed pathogenetic influence, with a population containing Europeans, the mixed races, and negroes, enjoying a high and singularly uniform degree of health.

Dr. John Wilson, in his Statistical Reports on the Health of the Navy, inquires, "Why is it that, in a land-locked harbour in this part of the world, under a powerful sun, surrounded by marshes and rich vegetation, ships lie for months or years without a single case of concentrated fever; while in Asia, in Africa, in North America, and more especially in the West Indian Islands, things, which to superficial observers appear the same, are productive of so much disease and death?"

Dr. Bryson, the successor of Dr. Wilson in the office of medical statistics at the Admiralty, also observes with reference to these shores:—

"Irrespective of geographical position and the almost universal presence of terrestrial sources whence fevers and agues are supposed to arise, they are, from the equator to Cape Horn, regions of surpassing beauty and salubrity."

Examining the whole of the evidence furnished by the various reporters on the late epidemic, it does not appear that, throughout the whole line of coast, there was, with the exception of Rio Janeiro (where, according to Dr. Lallemand, there were gastric and other affections) the slightest deviation from the usual high standard of health, previous to the outbreak of the fever at Bahia in the latter part of the year 1849.(a)

Dr. Lallemand, in his able Report, states that, at Rio Janeiro of late years, during the hot season, thunder-storms,

(a) It may be proper to mention that at Rio de Janeiro, at Pernambuco, at Bahia, and probably all along the Coast of Brazil, the inhabitants had, during each summer of four years preceding the late epidemic, suffered from a mild form of fever, which in no case proved fatal; and was therefore jocularly called the "polka," from the fact that its appearance in Brazil was nearly coincident with the introduction of the well-known dance of that name into that country. No one was twice attacked by the "polka;" but the fact of having had it gave no protection against an attack of its fatal successor, the yellow fever. I recollect that somewhere about the year 1830 a mild fever of this kind ran through nearly the whole of the West India Islands. Like the polka in Brazil, this fever obtained a whimsical appellation, "The Dandy Fever."

which had the effect of clearing the atmosphere, and heavy rains which cleansed the streets, are now much less common than they were some years back; and that four years since, and during the two following hot seasons, the city was visited by a disease, *sui generis*, called by him "insolation fever," and by others the "polka," which he considered to resemble the first stage or stadium of yellow fever, but never developed any of the grave symptoms, such as black vomitings, suppression of urine, and yellowness of skin, which characterized the late epidemic. Dr. Lallemand also says that the summer of 1849 was indisputably hotter than during former years, and that, although there was a good deal of lightning, there was little thunder or rain, and that gastric fevers were common. All the other medical men who replied to the question, "Was Rio healthy before the epidemic began?" distinctly declare that "the city was remarkably healthy." The same may be said of Bahia, Pernambuco, Para, and other ports from which information has been obtained. Mr. Cowper, the Consul at Pernambuco, informed me that the population, before the appearance of the fever, was very healthy, that the temperature of the atmosphere was 2° less than during some seasons, and 3° lower than it was two years ago.

I think, then, we have reason to believe that there was nothing remarkable in the weather along the Coast of Brazil during the summer of 1849, and that the inhabitants generally were in good health before the outbreak of the recent epidemic.

Regarding the nature of the epidemic: time will not allow me to go over the history of symptoms described by each individual reporter; but no one who will take the trouble to read those accounts, can for a moment doubt that the disease was yellow fever. The red, bleary eye, the black vomitings, the yellowness of the skin, the suppression of urine, and the rapid progress of the disease, sufficiently determine its nature. (a)

It may then be allowed, that the epidemic by which various provinces of Brazil were invaded during the latter part of the year 1849, was yellow fever.

The next and most important point to be ascertained is, whether this epidemic was of endemial origin, or a foreign introduction.

Ferreira da Rosa, a physician, of Olinda, in Brazil, describes a disease similar to yellow fever as having prevailed there in 1687, immediately after the conquest of Pernambuco. It was at this time that the ship *Oriflamme*, on her

(a) Suppression of urine was a very usual symptom during the yellow-fever epidemic at Boa Vista in the Cape de Verdes during the years 1845-46. Louis, in his account of the yellow-fever epidemic at Gibraltar in 1828, speaks of suppression of urine as only an occasional and rare symptom.

voyage from Siam to the West Indies, touched at Olinda, and, as it is said, became there infected with yellow fever, which she afterwards introduced into the island of Martinique, where Père Labat, on his landing, found the disease committing great ravages. Sir Gilbert Blane says that the yellow fever was "introduced into Lisbon in 1723, probably from Brazil." Dr. Gomes dos Santos, a physician still at Rio de Janeiro, states, that a fever, attended with "yellowness of skin and vomitings," but altogether of a milder form than the late disease, prevailed in that city during the years 1808-1809, but that it excited no interest beyond the limits of the province, Europe being at that time too much occupied with political events to take any notice of a fever in Brazil.

Attaching to these statements all the importance that belongs to them, we must, I think, admit, that nowhere in Brazil has there existed, within the memory of man, an epidemic similar to that which has recently ravaged that country.(b)

Yellow fever, from time immemorial, has occasionally raged in the adjoining countries, the Guyanas,(c) and in the West Indian Islands; but in Brazil, until 1849, the equator had always been considered the barrier against the progress of this pestilence southward.

In 1849, however, the yellow fever passed this boundary, and, according to all accounts, Bahia was the place where it first appeared. The situation and some of the leading features of Bahia have been already alluded to, as well as the immunity of that city, in common with the whole of the Brazilian coast, from disease, previous to the arrival of a vessel infected with yellow fever. And it now remains for me to inquire how far the supposition of the disease having been imported into Bahia is borne out by the circumstances of the case.

Here I must observe, that, besides the Brazil, another vessel, called the *Alcyon*, (by which the yellow fever is supposed to have been afterwards introduced into Pernambuco,) a French slaver, has been blamed for carrying the

(b) Mr. Cowper informed me that some old inhabitants of the province of Pernambuco affirm, that it was visited by a fatal epidemic in 1790, and for some years previous to that year.

There was also a report at Rio de Janeiro that a fever prevailed there at the close of the last century. Nothing certain concerning either of these epidemics has been obtained, either from oral tradition or literary sources. Garcia, in his "*Memorias Historicas de Pernambuco*," mentions an epidemic disease as having prevailed at Pernambuco between 1712 and 1720.

(c) Yellow fever prevails at the present time in French Guiana, the country adjoining Brazil. It is worthy of remark, that its first victims were among those of the higher ranks. The Governor, the Bishop, and the President of the Court of Appeal all died in the early period of the epidemic.

yellow fever to Bahia. Dr. Paterson, however, whose statements are altogether more circumstantial than any of the others I have seen, speaks only of the Brazil. Therefore I am inclined to think that, if the origin of the disease at Bahia is to be ascribed to importation by a vessel, that vessel was the "Brazil."

In the examination of this question I may be allowed to adopt the principle that guided me while investigating the Boa Vista epidemic, in which I considered that, although much light may be thrown upon the nature of the disorder during its ulterior progress, it is to the first cases of the epidemic that we look for the commencing link in the chain of that process by which we may trace out its true history, and ascertain the properties with which it is endowed.

Two deaths had already occurred on board the Brazil before her arrival at Bahia;(a) and from the concealment of them, as well as of two others that afterwards took place on board, it is probable she had the disease on board at the time of her arrival, on the 30th September, 1849. No case, however, was seen until the 3rd November, or before 34 days after the "Brazil's" arrival.

The first case, a Brazilian boy, who lived over a store frequented by the captain of the Brazil,(b) had been ill for several days, and, as death with black vomit ensued on the afternoon of the day on which he was first seen (3rd November,) the probability is, he had been laid up for four, five, or it may have been seven or nine days, thus reducing the interval between the arrival of the vessel and the occurrence of the first case to 30, 29, 27, or even 25 days. The second case, an Englishman, long resident in the country, who had been often visited at his own house by the captain of the Brazil, was also seen by Dr. Paterson on the 3rd November. The Englishman recovered; but, during his convalescence, a young man who lived with him was seized with the disease, and died on the ninth day with black vomit.

The occurrence of the first case being, at the lowest reckoning, 25 days after the arrival of the vessel suspected of having brought the disease, would leave a long period of inactivity on the part of the disease, between the ship and the shore, were we obliged to believe that the fever poison, if imbibed at all from the captain, could only have been imbibed on the first day. But we are by no means driven to adopt such a supposition. The captain, for a consider-

(a) The Brazil arrived on the 30th of September, having landed a cargo of slaves at Havannah. "There is no doubt of some of the crew having died on the passage."—Consul Porter's Letter.

(b) The first victim was in the house frequented by the captain of the Brazil, and among the first was the American Consul, who, it is believed, was on board the Brazil. Four or five others, living in the same hotel with the American Consul, died among the first.—Consul Porter's Letter.

able time after the arrival of the vessel,—in fact, until the death of the boy,—had been in the daily habit of visiting the American store and the house of the Englishman ;(c) therefore, supposing that the boy and the Englishman were infected by the captain, infection may have taken place after an interval sufficiently long from the arrival of the vessel to bring the incubative period within a very reasonable limit.

But then it nowhere appears that the captain was at all sick ; therefore, if he infected the boy and the Englishman, he must have done so through the medium of “fomites,” a means of communicating disease the existence of which many will be disposed to question, even more than that which is said to result from contact with a sick person, and concerning which all must admit our knowledge is still in a very imperfect state. The information from Dr. Alexander Paterson, which, as has been already mentioned, was not received until some time after this paper was written, renders the introduction of the fever into Bahia by the Brazil even still more probable. Dr. Paterson, to use his own words, “on the strongest possible evidence,” ascertained that the disease first appeared in that part of the city (Santa Barbara) where the passenger by the Brazil went to lodge, and within three weeks after that vessel’s arrival.

But, independently of all reasoning regarding the period of incubation, or the exact period of the outbreak of the epidemic, I would ask the candid and unprejudiced, whether it be not a remarkable fact that Bahia was the port of Brazil first invaded by yellow fever, and that at that port a vessel had a short time before arrived, which, if not actually at the time suffering, had suffered during the passage from this terrible scourge ?

If, as some allege, the yellow fever of Brazil was due to an endemial cause, it must I think be admitted, as indeed singular, that throughout this vast empire, comprehending a territory at least twelve times as large as the whole of France, the very first spot that cause should select for the development of its influence was that at which a vessel infected with the same disease had just before arrived.

That the outbreak of the fever at Bahia, and the arrival of a vessel infected with the same disease were mere coincident events, is certainly possible. But those who contend for such a coincidence must allow that it was, under all circumstances, one of a most extraordinary nature.

At Pernambuco the first case occurred in the cleanest and

(c) The captain of the Brazil slept in the Englishman’s house, and the American Consul, whose house he frequented on duty, were among the first victims.—Speech of the President of the Province, at the opening of the Provincial Assembly at Bahia, 1st March, 1850.

airiest part of the town, and that furthest removed from the harbour, within a week after the arrival of a vessel infected with yellow fever. Some cases had been received into the French hospital (San Antonio) from this vessel. But there is no evidence to show that Dr. Paton, the subject of the first case, was ever near them or the infected ship.^(a) The next case was Dr. May's apothecary, who also lived in the British hospital (Boa Vista.) From this centre the disease radiated, first over the whole city and afterwards throughout the entire province. Mr. Cowper, the Consul, informed me that during the progress of the epidemic many positive instances of contagious propagation came under his own notice, of which the following are examples:—

In the early part of the epidemic a wagoner was sent into the city from Engenhio Caruana, an estate five leagues in the country, belonging to Dr. Domingos de Souza. Having finished his business in the city, where he remained many hours, the wagoner sickened on his way home, and shortly after his arrival there showed unequivocal symptoms of yellow fever, of which he soon died. Those who attended him were next attacked, and the disease speedily spread over the whole estate. So great was its mortality, that Dr. Domingos was obliged to beg aid from the neighbouring estates, which was refused, upon the ground that the appearance of the disease on his own estate afforded so palpable an evidence of contagion. Mr. Cowper is certain there was no disease on the estate before the return of the sick wagoner from the city.

Mr. Cowper furnishes another case of this kind. He says: "When all communication with the Alcyon was forbidden, M. Lassere, her consignee, offered this measure all the opposition in his power. To show his contempt for infection, he went on board the Alcyon daily for several days until he was laid up with fever, and died upon the third day. His death created the greatest panic on shore. Up to this period, the fatal cases had been confined to seamen and new comers; but M. Lassere was a man of robust constitution, had been resident in the country twenty-five years, and his wealth enabled him to obtain the first medical aid; notwithstanding all this he died, and from that moment no one considered himself safe. He died at his country house in the village, or rather district, of Capunga, where my cottage adjoined

(a) In a former note, written after this paper was read at the Epidemiological Society, I have said that the only known connexion between Dr. Paton and an infected place, was a seaman from Bahia, who entered the British Hospital with fractured ribs. I learn from Dr. May, now in this country, that, before Dr. Paton was attacked, one or two other cases had occurred in the town immediately after the arrival of the Alcyon; but that their occurrence was kept secret. Dr. May says, from this circumstance he could not discover whether they could be traced to contact with the Alcyon or her crew, although this very probably was the case, as they lived in that part of the town much frequented by seamen.

his place. Capunga had been perfectly healthy up to this period ; but, within a week, twenty cases of fever, and five deaths, had occurred."

At Rio de Janeiro a considerable time elapsed between the arrival of the vessel alleged to have introduced the yellow fever, and the appearance of that disease on shore.

Dr. Lallemand infers from the disproportionately small number of her crew (nine) for a bark, and from the suspiciously hurried manner in which the captain disposed of his vessel, that she had already before arriving at Rio lost some men from fever. But in a case of this kind mere conjectural evidence cannot be taken. Granting that there were suspicious circumstances attending the arrival and selling off of the vessel, there is no proof that her crew were at all sick at that period, and no one of them was found sick earlier than the 28th of December, 1849. It is true, the man Andersson, one of the Navarre's sailors, had been laid up some days at Frank's house, before his admission into the "Rua da Misericordia" Hospital. Now, making the same allowance for the probable period he was ill at Frank's house, as was made in the cases at Bahia; and deducting accordingly four, five, seven, or nine days from the time of the Navarre's sailing from Bahia, and the same number of days from that of her arrival at Rio de Janeiro, the interval between the outbreak of the disease among her crew, and those periods respectively, will be reduced to twenty-nine, twenty-eight, twenty-six, or twenty-four days; and twenty-one, twenty, eighteen, or sixteen days.

Dr. Croker Pennell states that there were many cases where no source of infection could be traced. He also says that several masters of vessels declared to him that, though coming direct from Europe, fever made its appearance on board of their ships as soon as they approached the coast of Brazil, and that, from the accounts the masters gave of the disease, it appeared to be the same as that prevailing at Rio, but slighter. The same was said regarding vessels arriving at Bahia; but Dr. Paterson soon found out that these cases were merely from attacks of the mildest nature, and not yellow fever.

The argument derived from the long absence of yellow fever from Brazil may alike be taken hold of, although differently applied, by those who favour and those who oppose the doctrine of the contagious nature of this disease.

The former may, with propriety, ask, How is it that, for nearly a century, yellow fever has not appeared in Brazil, if the recent epidemic depended upon endemic causes, seeing that, at the period in question, there was no meteorological or other influence likely to induce any unusual operation of such causes?

The latter may, with equal reason, inquire, why, if the

yellow fever was imported into Brazil, was it not introduced until lately, seeing that there has been, for a long period, constant and unrestricted intercourse between the ports of that country and the coast of Africa, the Havana, New Orleans, and other places notorious for the prevalence of yellow fever?

As it would be difficult, if not impossible, in the present state of our knowledge, to answer the question of either party, the value to each of any argument deduced from the long immunity of Brazil from yellow fever, is thus, to a certain extent, neutralized; nevertheless, I think, it must be owned, that the general healthy condition of that country immediately before the outbreak of the late epidemic, is a fact of considerable importance in the present investigation, inasmuch as it has enabled us to determine with accuracy the periods at which the various ports were invaded by the fever, and, moreover, will assist us materially in endeavouring to ascertain why some intermediate as well as distant ports continued wholly exempt.

The following Table shows, at a glance, the chief ports that were invaded by the fever, and some of those that escaped, during the epidemic of 1849-50.

Place.	Latitude.	Longitude.	When Fever Appeared.	Remarks.
Bahia	13° S.	38° 42' W.	Nov. 3, 1849.	{ Ship "Brazil" arrived 30 Sep., 1849, sickly, from Havana.
Pernambuco ...	8° S.	34° 50' W.	Dec. 25, 1849.	{ Ship "Alcyon" arrived from Bahia, having been sickly on the voyage, 17th Dec. 1849.
Rio de Janeiro	22° 53' S.	43° 12' W.	{ Dec. 29th, Island in Bay, Dec. 28th, City. }	{ Ship "Navarre," Dec. 3, 1849, arrived.
Paraíba	January, 1850.	...
Para	1° 18' S.	...	March, 1850.	...
Porto Allegre, } Rio Grande } do Sul. }	30° S.	...	April, 1850.	{ One case only in the whole province.
Maranhão ...	2° 30' S.	43° 50' W.	Escaped.	{ Rigid quarantine.
Ciara	{ Between 3rd and 4th degree	...	Do.	{ Little or no communication with infected ports,
Aracati	{ South Latitude.	...	Do.	Do.
Parnahyba	Do.	Do.
Monte Video ...	34° 55' S.	56° 10' W.	Escaped.	Quarantine.
Buenos Ayres } in Rio de la } Plata. }	34° 37' S.	58° 16' 11" W.	Do.	Do.

Thus it is evident that the Brazil epidemic first broke out at Bahia, next at Pernambuco and Rio de Janeiro, the ports having the greatest intercourse with it, and afterwards at the other ports not in the order of proximity; but in the order of the frequency of their communication with an infected place.

There was fever at "Maceio," a port between three and four degrees to the northward of Bahia, before it was in any of the intermediate towns along the coast; and at Pernambuco, five degrees to the northward of Bahia, before it was at any of the many intervening towns. Passing Maceio, it broke out at Pernambuco, and was thence imported into Maceio by an infected vessel from Pernambuco. (a) It was at Para in 1° 18 south, in March, 1850; but all the while the ports of Maranham, of Parnahyba, of Aracati, and of Ciara, all lying between the second and fourth degree of south latitude, continued free from the disease. The escape of Maranham is ascribed to the rigorous quarantine enforced there upon all vessels from infected ports; that of the other three places just mentioned, to the almost total absence of any communication with those places where fever existed.

In the same manner the yellow fever was at Rio de Janeiro, ten degrees to the southward of Bahia, before it was anywhere, even within 100 miles, in the same direction. At Port Alegre, in Rio Grande do Sul, about eight degrees south from Rio Janeiro, there was one case in April. Monte Video and Buenos Ayres, in the Rio de la Plata, each enforced strict quarantine; and, although both were visited by infected vessels, they entirely escaped.

Had the disease depended upon a general morbid agency in the atmosphere, its spread certainly could not have been so obedient to a law regulated by the greater or lesser intercourse of places with infected ports; nor could its visitations along a line of coast of more than 4000 miles have been so partial, irregular, and capricious as they seem to have been. As little can the presence or absence of endemic localizing influences explain the invasion of one place by the fever, or the immunity of another. Witness the opposite results at Para and at Maranham ports, nearly similar in regard of climate and general physical condition.

Again, places very dissimilar as to situation, soil, and

(a) The late Dr. McHardy, of Maceio, thus wrote to Dr. A. Paterson:—

"The English ship *Emperor* arrived from Bahia on the 23rd December, with two of her crew convalescent, two having died in your hospital and another here, on the 27th, with black vomit; but I believe the disease was communicated here, not by her, but by a passenger who came from Bahia in a steamer, about the 25th, lived on shore in the house of a Portuguese merchant, where I was called to attend him the night he arrived. Some days after, a clerk in the same house was taken ill; and one of the partners died with black vomit, on the 12th Jan., 1850. All these parties had their meals in a room where the passenger slept on a sofa."

climate, equally continued free from the disease. Monte Video and Buenos Ayres, both lying beyond the southern extremity of Brazil, with a moderate climate, the one standing on a promontory on the northern bank, and the other on the southern bank of the river Plate, escaped throughout; but so did also Maranhão, burning under an average annual mean temperature of 80° Fahrenheit, and within two degrees of the Equator.

I consider, then, that the whole tenor of the evidence adduced bears out the following conclusions:—

1. That the Brazilian yellow fever epidemic did not arise from endemial causes.

a. Because, notwithstanding the presence of supposed endemial causes, yellow fever has been for nearly a century unknown in that country.

b. Because places where endemial influences were abundant escaped altogether.

2. That the epidemic did not depend upon any general morbid agency, either stagnant in or travelling through the atmosphere.

a. Because while some places were affected by the fever, others near to them, and under the same conditions of soil and climate, remained free.

b. Because the disease sometimes followed the direction of the south-east trade wind, and at other times travelled in the teeth of that wind.

3. That the evidence of the importation of yellow fever into Bahia, Pernambuco, and Rio de Janeiro, although not of so absolute and positive a nature as there was in the case of Boa Vista, in the Cape de Verdes, is still sufficiently presumptive to warrant the belief that that disease was a foreign introduction into these and other ports of Brazil.

a. Because each of these ports was healthy before the arrival of a vessel infected by yellow fever.

b. Because, after the appearance of the disease on shore, its general spread was in accordance with the law of contagious diseases, and because positive evidence of contagious propagation was manifested in particular cases.

c. Because ports, having little or no communication with infected places, and ports at which quarantine measures were adopted, entirely escaped the disease.

Lastly. Yellow fever, unlike cholera and typhus fever, which may prevail at ordinary and even at low temperatures, requires a high temperature, and that of some duration, for its maintenance.(a) It is even driven from the flats on the

(a) Rush is the only author, so far as I am aware, who considers that yellow fever can be maintained under a low temperature. Sir Gilbert Blane was of opinion that Leghorn, 43° north latitude, was "the most northerly place it could reach." Caillot says yellow fever was imported into Brest (in

coast of intertropical Mexico between the months of November and March, when the mean heat does not exceed 71° Fahr. Wherever this disease has visited in the old world, it has always been preceded by a season of unusually high temperature. The mean heat of the hottest month in England does not exceed 61°3 Fahr.(b) Hence, experience justifies us in concluding that yellow fever, even if introduced into this country, can never find an abiding-place here.

48°23 north) and communicated to a custom-house officer of that place. His words are : —“ La ville de Brest, située beaucoup plus au nord que Cadix, a pourtant eu de preuves non équivoques du caractère contagieux de la fièvre jaune. Lorsque cette maladie était dans toute sa force au Cap (San Domingo) et qui revenait beaucoup de vaisseaux à Brest un employé des douanes fut placé abord de l'un de ceux qui avaient perdu du monde pendant la traversée; pendant le temps de son séjour abord, cet homme contracta un fièvre jaune, dont il mourut dans moins de trois jours.” Two other custom-house officers were afterwards attacked, and one of them died. Cases similar to these occurred in the *Eclair*, while on her passage from the Motherbank to Standgate Creek, and while at Standgate Creek, in October, 1845. There were also two men sent on shore to Woolwich Infirmary, from the *Growler*, (which, like the *Eclair*, had just arrived from the west coast of Africa,) who died of unequivocal yellow fever. Neither the cases at Brest, nor those in the *Eclair*, can be considered to furnish absolute evidence of contagious propagation; for some will say that they were caused by the agency of a local cause in the ship herself, independent of the crew. They merely show that yellow fever can exist, for a very brief period, in countries situated considerably beyond the tropics.

(b) Mr. Glaisher, of the Royal Observatory, Greenwich, has kindly given me the following mean temperature of every month, as deduced from 79 years' observations:—

	Fahr.		Fahr.
January	35°7	July	61°3
February	38°2	August	60°5
March	40°9	September	56°3
April	45°7	October	49°3
May	52°6	November	44°4
June	58°0	December	38°8



